HISTORIC RAILROAD BUILDING TREATMENT REPORT
Task 3.b.5 – Building Structures

1-0 HISTORIC RAILROAD BUILDING TREATMENT REPORT

1-1 Introduction

The Southern Pacific Railroad Passenger Depot, the Southern Pacific Railroad Freight House, and the American Railroad Express Station buildings are located adjacent to the Union Pacific main line as it passes through downtown Reno. These buildings were constructed in the period between 1925 and 1931 and served as transfer depots for passengers and freight. Presently only the Southern Pacific Railroad Passenger Depot continues to be used by the railroad.

These buildings will be affected by the Reno Railroad Corridor due to their close proximity to the alignments of the depressed main line and the shoofly. Because of their association with the railroad industry, these buildings appear eligible for listing in the National Register of Historic Places. (See the attached National Register of Historic Places Nomination Form (1).)

As part of the Reno Railroad EIS and for compliance with Section 106 of the National Historic Preservation Act, the design team has conducted an evaluation to identify alternatives for mitigation of the effects that the railroad corridor construction might have on the buildings. This report presents our findings.

1-2 Background

1-2.1 Southern Pacific Railroad Passenger Depot

The Southern Pacific Railroad Passenger Depot, also known as the Amtrak Station, is located at 135 East Commercial Row and encompasses approximately 6,400 square feet. It is a single story building with a partial basement for the boiler equipment. The style of architecture is Mediterranean Revival. The building is in fair condition.

Plans for the building have been researched to assist in the evaluation of the structure (2). The Southern Pacific Railroad Passenger Depot's structural system is consistent with other buildings of that era. The roof is gabled over the central terminal area and is flat over the west and east wings. Both the gabled roof and the flat roofs have timber trusses spanning the transverse (north-south) direction. The walls are comprised of either reinforced concrete or unreinforced brick and bear on concrete foundations. The floor is a concrete slab on grade except over the boiler room where the floor is a reinforced structural slab.

According to the building plans, a separate room for baggage was to be included on the western end of the Depot's west wing. Either the baggage room was never constructed or it was later demolished as this area is now occupied by the Reno Turf Club, which is a separate building of more modern construction (built 1966) and architecture. The Reno Turf Club also occupies a room within the west wing of the Depot building.

The Southern Pacific Railroad Passenger Depot's function as a rail passenger terminal has remained mostly unchanged since it was constructed in 1925-1926. The building is still used for ticket purchase and to control access to the trains. It appears to have maintained its original layout and occupancy over the years with the exception of the room in the west wing now occupied by the Turf Club.

1-2.2 Southern Pacific Railroad Freight House

The Southern Pacific Railroad Freight House is located at 270 North Evans Avenue and was built in 1931. As shown on the building plans (3), the facility is comprised of three components – the two-story freight house and general office, the freight shed, and the transfer platform. The freight house and general office are situated in a two-story reinforced concrete structure with an Art Moderne style of architecture. The roof and second floor are wood-framed while the first floor is a concrete slab on grade. The foundation system consists of concrete footings. This portion of the building appears to be in good condition.

The freight shed exhibits wood-framed construction and shares a common wall with the freight house/general office. This portion of the building is more industrial in appearance than the two-story portion. The roof system is comprised of timber rafters and trusses with timber sheathing. The floor is a concrete slab on grade located approximately 4 feet above the adjacent finished grade. Sliding doors on both the north and south sides of the shed allow movement of freight to and from the shed. The freight shed appears to be in fair condition considering its age and use.

Directly east of the freight shed is the transfer platform, an exterior covered loading dock. The roof consists of steel frames with timber rafters. Each frame is supported by a single steel column located at the center of the frame. The floor is also a concrete slab on grade located 4 feet above finished grade. The west and east ends of the roof and the east end of the dock have been previously removed. The transfer platform is in a state of disrepair.

1-2.3 American Railway Express Station

Located at 270 North Lake Street between the Southern Pacific Railroad Passenger Station and the Southern Pacific Railway Freight House, the American Railway Express Station was originally built in 1925-1926 as a parcel handling depot. Today, the building is used as a restaurant. It is a rectangular, single story building encompassing approximately 6000 sf. Originally the building had a Mediterranean Revival style of architecture but subsequent remodels in the 1970s and 1980s have obscured some of the original architecture. Although building plans are not available, the structural system is assumed to be similar to the Southern Pacific Railroad Passenger Depot.

1-3 Mitigation Options

It has been recognized that the construction of the rail corridor will affect these buildings and that mitigation of these effects is necessary to preserve their historical value.

In conjunction with the State of Nevada State Historic Preservation Office (SHPO), the following three mitigation options have been identified. They are listed in order of SHPO's preference:

Option 1. Realign the rail corridor to the north to avoid impacts to the buildings.

Option 2. Leave the rail corridor alignment as planned and underpin or otherwise protect the buildings in their current location.

Option 3. Leave the rail corridor alignment as planned, underpin the Southern Pacific Railroad Passenger Depot and temporarily relocate the American Railway Express Station and a portion of the Southern Pacific Railroad Freight House.

Each of these treatment options is discussed in further detail in the following sections of the report.

Certain aspects of the project are common to each option and do not significantly affect which treatment option is chosen. The most significant common feature involves passenger and baggage access to Amtrak once the main line is depressed. Currently, passenger and baggage access occurs at the original finished grade. Under Rail Corridor Alternative 2, the elevation differential between the Southern Pacific Railroad Passenger Depot's ground level floor and the top of the depressed rail is 25 feet. This differential increases to about 28 feet under Rail Corridor Alternatives 3 and 4.

In order to provide accessibility for disabled persons, a passenger elevator is required. A separate elevator is necessary for baggage transfer. The area required to accommodate an elevator system along with a set of stairs has been determined to be too disruptive to the existing layout of the Southern Pacific Railroad Passenger Depot. However, with the removal of the Turf Club, the area west of the Depot is available for an addition containing the elevators and stairs along with a lower level waiting area. Schematic layouts of the addition as prepared by Sheehan Van Woert and Bigotti Architects are shown on Plates 1 through 6 (4). In a letter dated March 31, 2000, the SHPO generally agrees with the proposed addition, although the final design would require review to ensure that the addition meets the Secretary of the Interior's Standards for Rehabilitation. The cost for this addition has been included in the total cost for each option.

1-3.1 Mitigation Option 1 – Realign the Rail Corridor

The feasibility of an alignment offset or shift of the railroad corridor in the vicinity of the historic buildings was investigated. It is assumed that a 10-foot shift to the north would be necessary at the American Railway Express Building and the Southern Pacific Railroad Freight House to provide sufficient space to construct the adjacent depressed rail wall. This would then provide approximately 7-feet between the north wall of these buildings and the front face of the depressed rail wall. Drawings of this realignment depicting that portion of the realigned corridor between Virginia Street and the Freight House are included as Plates 7, 8 and 9.

Using Union Pacific Railroad requirements as a basis of design, the realignment was accomplished by using 0º-30' reversing curves with 40-foot spirals, 300-foot intervening tangents and 15-foot wall clearances. This realignment creates an impact to the Flamingo-Hilton Parking Garage and a potential impact to the National Bowling Center.

At the Hilton garage, the north edge or backside of the trench wall would be situated approximately 7-feet beyond the garage's south wall. Underpinning of this wall would not be possible with this amount of intrusion. Therefore, the garage would have to be demolished and re-built to avoid the realigned corridor. At the National Bowling Center, the north side of the trench wall would be immediately adjacent to the columns supporting the Bowling Center. Underpinning of these columns, while feasible, would be difficult to accomplish.

An adverse impact for the railroad will be an increase in track maintenance caused by the curved track when compared to the existing railroad alignment. Extra rail grinding will be necessary to reestablish railhead contour in the curves with premature replacement of this rail in the 2,000-feet of curved track due to reduced service life.

No other adverse impacts are expected as a result of this realignment.

1-3.2 Mitigation Option 2 – Underpin the Historic Buildings

1-3.2.1 Southern Pacific Railroad Passenger Depot

The Reno Rail Corridor alignment plans show the front face of the depressed main line wall to be approximately 8 feet north of the Southern Pacific Railroad Passenger Depot's north wall. Assuming the depressed rail trench wall to be about 4 feet thick, the outside face of the trench wall will be 4 feet away from the Southern Pacific Railroad Passenger Depot. The shoofly will be located to the south of the Southern Pacific Railroad Passenger Depot and Turf Club. It clears the southwest corner of the Depot by about 12.9 feet but overlaps with the Turf Club footprint. These relationships are shown on Plates 10, 11, and 12.

Due to the close proximity of the depressed rail to the Depot, there is concern that, during construction, the vertical load from the Depot's north wall will apply lateral earth pressures to the trench wall, thereby complicating its construction. The alternatives for avoiding application of this surcharge load to the trench wall are limited.

The vertical load to the Depot's north wall consists of the roof dead load and the self-weight of the north wall. Since the roof trusses bear on the north wall, shoring of these trusses to remove the load from the north wall will not entirely eliminate the surcharge load. Therefore, the building must either be temporarily relocated or underpinned. Relocation of this building is not considered a preferred solution due to the historic significance of the building and the potential for damage. This option investigates methods of underpinning.

The criteria for selection of underpinning are as follows:

- The underpinning needs to extend a minimum of 40 feet below the existing finished grade to avoid surcharging the trench wall;
- The underpinning must be installed within 2 feet of the outside face of the existing Southern Pacific Railroad Passenger Depot footings;
- The underpinning must be able to penetrate cobbles and boulders that are likely to be present. (See Boring 23 from the geotechnical report (5).)

Based on these criteria, two possible methods for underpinning have been identified. The first method involves the installation of power-installed steel screw anchors such as those manufactured by AB Chance Company (6). These anchors consist of relatively small diameter steel shafts with helical-shaped plates attached to their ends. A torque motor is used to screw the anchors vertically into the soil at intervals of 6 to 10 feet on center. The anchor spacing is dependent on the flexural capacity of the existing foundations. Brackets are used to attach the anchors to the building foundation. This type of anchor can be installed in soils containing small cobbles but they will not penetrate boulders.

The second method that was reviewed involves the installation of micro-piles or pin piles. These piles are self-drilling and can penetrate boulders. Their spacing is dependent on the capacity of the existing foundation and/or the new grade beams. Consisting of 5 to 12 inch diameter hollow steel pipes, micro-piles are encased in grout and have capacities ranging from 100 to 300 kips. The primary load carrying capacity is derived from the frictional bond or skin resistance against the soil. If the micro-piles are located near a retaining wall, the skin resistance will impose a surcharge on the wall. To minimize this effect, the piles may require casing along a portion of their length.

Method 2 appears to be the better solution for underpinning of the building if boulders are present. Method 1 may be more economical if the soil does not contain many boulders.

As stated earlier, the shoofly will overlap the Turf Club footprint. Being of modern construction (built in 1966), the Turf Club is not considered to be historically significant and is not a candidate for relocation or mitigation. The shoofly alignment will result in the demolition of this building.

1-3.2.2 Southern Pacific Railroad Freight House

As shown on the Reno Railroad Corridor alignment plans, the Southern Pacific Railroad Freight House's north wall will be located on the depressed rail trench wall. If the building remains in this location, the depressed rail wall would need to be constructed directly under the Freight House's existing wall.

This can only be accomplished if underpinning is installed below the existing footings to support the vertical loads imposed by the Freight House. These vertical loads include the weight of the concrete walls as well as the tributary loads from the floors and roof. Unlike the underpinning of the Southern Pacific Railroad Depot, this same underpinning structure would be required to retain upwards of 25 feet of soil at the side of the depressed rail trench.

The main difficulty involved with the underpinning is its installation below the existing foundation system of an older building that may have concealed weaknesses. Although several underpinning options were considered, in this case only the use of micro-piles appears viable.

Micro-piles would be drilled through the existing spread footing into the underlying soil to the required depth (approximately 40 feet below existing finished grade). Since the micro-pile structure must transfer vertical load directly from the building foundation into the micro-piles, the underpinning should be symmetrically placed on both sides of the existing foundation. This will require drilling operations within the building with associated damage

to the building finishes. Micro-pile drill rigs exist that can operate within a confined vertical clearance of only 9 feet. It is anticipated that this type of rig would be needed for micro-pile installation within the building.

It is envisioned that the micro-piles may be clustered together in groups of four at approximately eight feet on center. Once the micro-piles are installed, a reinforced concrete cap would be constructed to interconnect the micro-piles to the building's foundation and to each other. When complete, the building's weight will have been transferred to the micro-piles and construction of the trench can commence.

For the typical trench wall, the construction is accomplished from the top down by equipment positioned directly above the wall. However, in the vicinity of the Freight House, the existing structure prevents direct access. This is an important and costly deviation from the typical wall construction type. The elimination of top down construction in this area will require Union Pacific to operate on the shoofly during construction of this portion of the trench wall. This will extend the shoofly operation at least several months.

As the soil is removed along the north side of the Freight House, a gunite wall system (similar to a soil nail wall) will be placed between the groups of micro-piles. This gunite wall will be laterally supported by tiebacks. This type of trench wall system will continue downward until the groundwater level is reached. At this point, the wall construction will change to a jet grout wall system to alleviate infiltration of groundwater.

The proposed underpinning wall system as described requires the use of heavy equipment around and within the building. The use of such equipment increases the risk of building damage and repair work should be anticipated. Furthermore, since the trench wall system in the vicinity of the Freight House will be different from other locations, the likelihood of ground settlement behind the trench wall system increases. Ground settlement may lead to future damage to the building.

1-3.2.3 American Railway Express Station

The impacts to the American Railway Express Station are the same as that of the Southern Pacific Railroad Freight House and the mitigation requirements would be similar.

1-3.3 Mitigation Option 3 – Combination of Underpinning and Temporary Relocation

1-3.3.1 Southern Pacific Railroad Passenger Depot

As indicated in the discussion for Option 1, relocation of the Southern Pacific Passenger Depot is not considered a preferred option due to its historic significance. For Option 3, the treatment of the Southern Pacific Passenger Depot will be the same as under Option 2.

1-3.3.2 Southern Pacific Railroad Freight House

As shown on Plates 10, 11, and 12, the north wall of the two-story portion of the Southern Pacific Railroad Freight House is situated on the depressed rail wall. As well, the shoofly alignment passes through the east end of the transfer platform and the southeast corner of the freight shed. If the shoofly alignment is shifted to the south to avoid the transfer platform

and freight shed, it will necessitate the relocation of an existing Sierra Pacific Power Company electrical substation at an estimated cost of approximately $5,200,000.

As a mitigation option, temporary relocation of the two-story freight house/general office has been considered. This portion of the building lends itself to relocation since its structural system and configuration provide inherent strength. This portion of the building can be moved approximately 15 feet to the south which will provide clearance from both the depressed rail construction and the shoofly.

Relocation of this portion of the building will generally occur as follows:

a. Since only the freight house/general office portion of the building is being relocated, the first task will be to disconnect the two-story portion from the freight shed. Concurrently, strengthening of the structure to insure its integrity will be performed prior to lifting. The strengthening will involve the addition of ties at selected areas such as the roof to wall interface.

b. A system of steel beams will be inserted across the building above the floor slab and will be used to raise the structure from the foundation. Once the building is raised, steel tracks and rollers will be placed below the beams. Finally, hydraulic rams will push the building along the rollers to its temporary position. Once the building has been moved, the foundation and lower floor slab will be demolished.

c. Upon completion of the depressed rail trench and after removal of the shoofly, the freight house/general office can be moved back to its original location. New foundations will be constructed prior to the move. New floor slabs will be constructed after the building is in place. Interior and exterior repairs will occur after the building has been set on its new foundations. Access, utility service, and other site work will be restored to allow resumption of its former use.

Relocation of the freight shed is also possible. However, since only the southeast corner encroaches into the shoofly clearance, it would be less disruptive to the overall building to dismantle the roof and walls at the east end of the building. These elements can be stored within the remaining portion of the building. The foundation and slab at the southeast corner can be carefully saw-cut and temporarily relocated outside of the clearance zone. Upon removal of the shoofly, the foundation and slab can be re-installed with any associated damage repaired. The walls and roof can then be rebuilt.

Due to its altered and deteriorated condition, the transfer platform is deemed to have substantially less historic value. That portion of the transfer platform within the shoofly clearance zone will be demolished, unless SHPO requires that it also be moved.

1-3.3.3 American Railway Express Station

The south wall of the depressed rail trench will also encroach into the footprint of the American Railroad Express Station. This building's significance as a historic structure is diminished due to the alterations from the 1970s and 1980s and changed use but demolition is not recommended.

Choices for mitigation are the same as for the Southern Pacific Railroad Freight House. Since this building's structural system also lends itself to moving, it can also be temporarily relocated away from the trench wall. The relocation will occur in a similar fashion as the Southern Pacific Railroad Freight House. When the depressed rail walls are completed and when the shoofly is removed, the building will be moved back as close as possible to its original location.

1-4 Recommendations

As part of the evaluation effort, budgetary construction costs as shown in Table 1 have been developed for comparative purposes. These costs are based on our preliminary analysis and are not to be considered final and complete costs. Each of these costs includes the cost for the addition to the Southern Pacific Railroad Passenger Depot. Options 2 and 3 do not include the costs associated with preserving the Freight House transfer platform should that be required.

Table 1: Preliminary Opinion of Probable Construction Cost

Mitigation Alternative		
1	Realignment of the Rail Corridor	$12,800,000
2	Underpin all buildings	$3,900,000
3	Underpin the Southern Pacific Railroad Passenger Depot; temporarily relocate the other buildings	$3,500,000

The base line for comparison of these treatment options was established using the following criteria:

- How do the budgetary construction costs compare?
- How much physical damage will the buildings sustain under each option?
- Under each option, how is the historic value of each building affected?
- Are there collateral impacts that deserve consideration?

Our evaluation shows that Option 1, realignment of the rail corridor, is not economically feasible. Options 2 and 3 are similar in terms of construction cost. Option 2 appears to result in less physical damage to the buildings. However, the difference in anticipated damage may be less than expected since Option 2 requires the use of heavy equipment within the buildings. From the perspective of diminution of historical value, the lesser impact would occur if the buildings were not temporarily relocated. The major difference between Options 2 and 3 is the increased duration of shoofly use under Option 2. The shoofly will be disruptive when it is in operation. The economic impact of the shoofly operation has not been evaluated but is considered to be substantial. For that reason, Option 3 is recommended as the preferred method of treatment.

During construction, it is recognized that the operations of these buildings will be disrupted and temporary facilities will be required. Alternatives for temporary facilities are being explored and will be presented at a later date.

1-5 References

1. Koval, Ana and Lawrence-Dietz, Patricia, 1983. National Register of Historic Places Inventory Nomination Form. U.S. Department of the Interior, National Park Service.
2. Passenger Station Plans, 1925. Southern Pacific Company.
3. Freight Station Plans, 1930. Southern Pacific Company.
4. Sheehan Van Woert Bigotti Architects, 2000. Southern Pacific Railroad Passenger Depot Addition Plans.
5. Kleinfelder, Inc., 2000. Geotechnical Engineering Report, Proposed Reno Railroad Corridor EIS Reno, Nevada.
6. Helical Pier Foundation System Literature, 1996. A. B. Chance Co.